STUDY ON ETHNOMEDICINAL KNOWLEDGE AND CONSERVATION STATUS OF IUCN LISTED TREE SPECIES IN THE COMMISSIONERATE REGION OF RANCHI JHARKHAND

SYNOPSIS

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Approved
Sneha Sahay
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Mannazaheen
18/12/2025.

Research Supervisor:

DR. SNEHA SAHAY
Associate Professor, Department of Botany School of Science,
YBN University

Research Scholar:

MANNA ZAHEEN
Enrolment Number- YBNU2402709
Department of Botany
School of Science, YBN University

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1. TITLE OF THE THESIS

STUDY ON ETHNOMEDICINAL KNOWLEDGE AND CONSERVATION STATUS OF IUCN LISTED TREE SPECIES IN THE COMMISSIONERATE REGION OF RANCHI JHARKHAND

2. INTRODUCTION

India is one of the world's richest countries in terms of biological diversity and traditional medicinal knowledge. Medicinal plants have been used since ancient times and remain vital for primary healthcare, especially in rural and tribal areas.Traditional systems like Ayurveda, Siddha, and Unani document extensive use of plant-based medicines. Ethnomedicinal knowledge refers to indigenous understanding of medicinal plant use, transmitted orally across generations. Such knowledge forms the foundation of herbal medicine and contributes to modern drug discovery (Veeresham, 2012).

Jharkhand, located in eastern India, is rich in forest resources due to its unique topography and climate. Around 30–40% of Jharkhand is under forest cover, supporting diverse medicinal and ecologically important tree species (Tirkey & Amit, 2023). The state is inhabited by tribal communities such as Santhal, Munda, Oraon, Ho, and Kharia, who depend on forest resources for healthcare. Different plant parts such as roots, bark, leaves, fruits, and seeds are traditionally used to treat various diseases.

Ethnomedicinal studies indicate Jharkhand as a valuable repository of traditional medicinal knowledge (Singh, 2017). This knowledge is declining due to modernization, socio-economic changes, and lack of systematic documentation. Many medicinal tree species are threatened by deforestation, overexploitation, habitat loss, and unregulated harvesting. Several important species are listed in the IUCN Red List as Vulnerable, Endangered, or Critically Endangered. Loss of these species results in biodiversity decline and erosion of traditional knowledge (Singh,2017). There is a lack of integrated studies combining ecology, ethnomedicine and conservation in Jharkhand. Therefore, the present study focuses on an integrated assessment of IUCN-listed tree species in the Commissionerate region of Ranchi Jharkhand.

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3. LITERATURE REVIEW

3.2 Ethnomedicinal Studies

Tribal communities of Jharkhand possess extensive ethnomedicinal knowledge (Tirkey & Amit, 2023). Various studies documented the use of tree species for fever, skin diseases, wounds, respiratory and digestive disorders (Raj *et al.*, 2018).

Ethnomedicinal knowledge is largely oral and under-documented, making it vulnerable to loss (Ghosh Jerath *et al.*, 2015)

3.3 Conservation Studies

Habitat destruction, illegal felling, overharvesting, and lack of awareness threaten medicinal tree species (Singh, 2017). Sacred groves and community forests play a role in in-situ conservation (Sahu *et al.*, 2025).

Researchers emphasize community participation and sustainable harvesting for conservation.

3.4 Research Gap

Literature reveals limited integrated studies combining ecology, ethnomedicine and conservation in Jharkhand.

IUCN-listed tree species of the Commissionerate region remain poorly studied.

There is a need for interdisciplinary research for sustainable utilization and conservation.

3.5 Conclusion of Literature Review

Jharkhand is rich in ethnomedicinal tree species with significant ecological and pharmacological importance.

Scientific validation of traditional knowledge is essential for drug discovery and biodiversity conservation.

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The present study aims to fill existing gaps through an integrated research approach.

Jharkhand is one of the most forest-dominated states of eastern India and forms an important part of the Chotanagpur Plateau. The state supports diverse forest ecosystems and is home to a large number of medicinally important tree species. Several studies have emphasized that Jharkhand forests play a crucial role in biodiversity conservation as well as in sustaining the livelihood and healthcare practices of tribal communities. Ecological Studies in Jharkhand Ecological research conducted in Jharkhand has reported significant pressure on forest resources due to mining, deforestation, industrialization, agricultural expansion, and urban development. Studies have highlighted changes in forest structure, species composition, and regeneration patterns in eastern Indian forests, including Jharkhand. Many native tree species show poor regeneration, indicating ecological stress and long-term population decline. Ethnomedicinal Studies in Ranchi Jharkhand is inhabited by major tribal groups such as Santhal, Munda, Oraon, Ho, and Kharia, who possess extensive traditional knowledge of medicinal plants. Several studies have reported the use of tree species for treating fever, gastrointestinal disorders, skin diseases, wounds, respiratory problems, and inflammatory conditions. Much of this knowledge is orally transmitted and remains scientifically under-documented. However, most research focused on commonly available plants rather than threatened or IUCN Red List tree species. Conservation Studies in Jharkhand Conservation studies emphasized that habitat destruction, illegal felling, overharvesting, and lack of awareness are major threats to forest tree species in Jharkhand. Researchers recommended community participation, sustainable harvesting, and integration of traditional knowledge with scientific conservation planning. Conclusion The literature review shows a lack of integrated studies combining ecology, ethnomedicine knowledge conservation of IUCN Red List tree species in Ranchi Jharkhand. The present research aims to fill this gap and contribute to sustainable biodiversity conservation and preservation of indigenous knowledge.

India is one of the world's richest countries in terms of plant biodiversity and traditional medicinal knowledge. Indigenous systems such as Ayurveda, Unani, and Siddha collectively utilize hundreds of plant species for therapeutic purposes.

Tribal communities have preserved ethnomedicinal knowledge through oral traditions, forming the backbone of primary healthcare in rural regions.

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Jharkhand, part of the Chotanagpur Plateau, is particularly rich in forest biodiversity, with nearly 40% forest cover and over 30 tribal communities relying on medicinal plants for healthcare (ResearchGate). Traditional healers (vaidyas and ojhas) use different plant parts—roots, bark, leaves, and fruits—to treat diseases such as fever, diabetes, gastrointestinal disorders, and infections.

2. Ethnomedicinal Knowledge and Traditional Uses

Ethnomedicinal knowledge is a crucial component of biodiversity conservation and drug discovery. Tribal communities use plants based on empirical knowledge accumulated over generations.

Common ethnomedicinal uses include:

- Treatment of respiratory diseases, wounds, fever, and digestive disorders
- Use of bark and roots for chronic ailments
- Leaves for topical and internal therapies

Studies highlight that many plants are used for multiple ailments, indicating their broad therapeutic potential (SpringerLink). For example:

- *Ficus religiosa* is used in treating asthma, diabetes, and inflammatory conditions
- *Azadirachta indica* (Neem) is widely used for antimicrobial and skin diseases

Ethnomedicinal practices form the basis for modern pharmacological validation.

4. IUCN Status and Conservation Concerns

Many medicinal tree species are now under threat due to:

- Deforestation
- Overexploitation for medicinal use
- Habitat fragmentation
- Climate change

The IUCN Red List categorizes species into threatened categories such as:

- Vulnerable (VU)
- Endangered (EN)
- Critically Endangered (CR)

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Sacred groves and community-managed forests play a significant role in conserving such species. However, increasing anthropogenic pressure is leading to the erosion of both biodiversity and traditional knowledge systems (ResearchGate).

5. Research Gaps

Despite extensive studies, several gaps remain:

- Limited region-specific studies on IUCN-listed tree species in Jharkhand
- Lack of integration between ecological data and pharmacological validation
- Insufficient conservation strategies based on scientific data
- Poor documentation of indigenous knowledge

6. Conclusion

The literature highlights that Jharkhand is a rich repository of ethnomedicinal tree species with significant ecological, pharmacological, and cultural importance. The integration of traditional knowledge with modern scientific approaches is essential for:

- Drug discovery
- Biodiversity conservation
- Sustainable development

There is an urgent need for comprehensive, region-specific, and interdisciplinary studies focusing on IUCN-listed tree species to ensure their conservation and sustainable utilization.

4. OBJECTIVES OF THE STUDY

The present study aims to undertake a comprehensive and interdisciplinary investigation of IUCN-listed tree species in the commissioner region of Jharkhand, India, with special emphasis on their ecological attributes, ethnomedicinal significance, phytochemical composition, pharmacological potential, and conservation status.

Specific Objectives

1. To systematically document and identify tree species listed under the International Union for Conservation of Nature (IUCN) occurring in the study region.
2. To document and analyze the traditional ethnomedicinal knowledge associated with these species among indigenous and local communities.
3. To examine the conservation status of these species and identify major anthropogenic and environmental threats affecting their survival.

Need of the Study

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The present study is essential due to the rich biodiversity and tribal heritage of the commissionerate region of Ranchi Jharkhand, particularly in areas such as An Ormanjhi . These regions are characterized by dense forest cover and diverse tree species, many of which hold significant ecological, medicinal, and economic value. Indigenous communities in these areas rely heavily on forest resources for their primary healthcare and livelihood.

Despite this richness, many IUCN-listed tree species found in Angara, Ormanjhi, Silli, Nagri, and Bundu are facing serious threats due to deforestation, overexploitation, urban expansion, and lack of effective conservation measures. The conservation status of these species at the local level remains poorly documented, creating a gap between global assessments and ground realities.

Moreover, the ethnomedicinal knowledge of local tribal communities in these regions is rapidly declining due to modernization and insufficient documentation. This traditional knowledge, which has been passed down orally for generations, is at risk of being lost permanently.

In addition, there is a lack of integrated studies combining ecological assessment, ethnomedicinal practices, phytochemical analysis, and pharmacological evaluation of tree species in these specific areas. Many species may contain valuable bioactive compounds, but their full potential has not been scientifically explored.

Therefore, this study is needed to document and preserve ethnomedicinal knowledge, analyze phytochemical and pharmacological properties, understand ecological distribution, and assess the conservation status of IUCN-listed tree species in Ormanjhi, . The findings will contribute to biodiversity conservation, sustainable resource management, and the integration of traditional knowledge with modern scientific research.

The present study is essential due to the rich biodiversity and tribal heritage of the commissionerate region of Ranchi Jharkhand, India, which harbors a wide variety of forest tree species with ecological, medicinal, and economic significance. Jharkhand is known for its dense forest cover and diverse flora, where a large number of indigenous communities depend on plant resources for their primary healthcare and livelihood.

Despite this richness, many IUCN-listed tree species in the region are facing threats due to deforestation, urbanization, overexploitation, and lack of proper conservation strategies. The conservation status of these species is not adequately documented at the regional level, creating a gap between global conservation listings and local ground realities.

At the same time, the traditional ethnomedicinal knowledge possessed by tribal communities is rapidly declining due to modernization and lack of proper documentation. Much of this knowledge is orally transmitted and is at risk of being lost.

Therefore, this study is needed to document ethnomedicinal knowledge understand ecological aspects, and assess the conservation status of selected tree species. The study will help in bridging the gap between traditional knowledge and modern science while supporting biodiversity conservation and sustainable utilization.

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5. METHODOLOGY

A. Ethnomedicinal Study

Data Collection

- Semi-structured interviews with:
  - Traditional healers (Ojha, Pahan)
  - Elder tribal informants
- Participatory Rural Appraisal (PRA)
- Field walks with informants

Information Recorded

- Local names
- Plant parts used
- Disease treated
- Preparation method (decoction, paste, juice, etc.)
- Dosage and administration

Quantitative Indices

- Use Value (UV)
- Informant Consensus Factor (ICF)
- Fidelity Level (FL)
- Relative Frequency of Citation (RFC)

B. Conservation Assessment

IUCN Status Verification

- Global Red List categories
- Local population trend analysis

Threat Analysis

- Deforestation
- Grazing pressure
- Fuelwood extraction
- Habitat fragmentation

Conservation Tools

- GIS mapping of species distribution

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- Hotspot identification
- Regeneration potential study

Conservation Strategies

- In-situ conservation (forest protection)
- Ex-situ conservation (nurseries, botanical gardens)
- Community-based conservation models

5. Data Analysis

- Statistical tools: SPSS / R software
- ANOVA for phytochemical comparison
- Correlation between ethnomedicine and phytochemicals
- Multivariate analysis (PCA, cluster analysis)
- GIS mapping (ArcGIS/QGIS)

6. EXPECTED OUTCOMES

1. Ethnomedicinal Knowledge System Documentation

- Comprehensive documentation of indigenous ethnomedicinal knowledge systems practiced by tribal and rural communities.
- Identification of plant-based traditional healthcare practices, including disease categories treated, preparation methods, and dosage forms.
- Quantitative validation of ethnobotanical data using indices such as Use Value (UV), Informant Consensus Factor (ICF), Fidelity Level (FL), and Relative Frequency of Citation (RFC).
- Preservation of depleting traditional knowledge systems through scientific documentation.

2. Conservation Status Assessment

- Assessment of population decline, regeneration failure, and habitat degradation trends of IUCN-listed tree species.
- Identification of threatened, vulnerable, and locally endangered species in the study region.
- Mapping of species distribution and conservation hotspots using GIS tools.
- Evaluation of anthropogenic pressures such as deforestation, fuelwood extraction, grazing, and land-use change.

4. Conservation and Management Framework

- Formulation of scientifically informed conservation strategies including in-situ and ex-situ approaches.

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- Recommendations for community-based conservation and sustainable utilization models.
- Support for forest management policies and biodiversity conservation planning in Jharkhand.
- Identification of species suitable for restoration, plantation, and agroforestry programs.

6. Scientific and Societal Contribution

- Contribution to the global database of ethnomedicinally important and IUCN-listed tree species.
- Enhancement of knowledge in integrated biodiversity science combining ecology, chemistry, and traditional medicine.
- Strengthening of tribal knowledge recognition and its scientific validation.
- Potential identification of novel bioactive compounds for future pharmaceutical applications.

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